

**EXAMINING AIR MOBILITY COMMAND  
SUPPORT TO THE  
EXPEDITIONARY AEROSPACE FORCE**

**GRADUATE RESEARCH PAPER**

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EXAMINING AIR MOBILITY COMMAND SUPPORT  
TO THE  
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## **Abstract**

The Air Force has been tasked at an ever-increasing rate to support contingency operations around the world. These operations range from providing relief supplies to hurricane victims to providing combat firepower to enforce no-fly zones in Southwest Asia. As the Air Force responds to these contingencies, its opstempo has risen dramatically. The family lives of Air Force people are disrupted by the frequent and unpredictable deployments, which pushes experienced people out of the service.

To counter these almost daily crises, the Air Force is creating a new organizational structure, the Expeditionary Aerospace Forces. The structure is based on providing light, lean forces, tailored to each individual contingency that allows rapid and decisive response to any potential crisis. This concept allows stability by providing a 15-month fixed schedule of what units would deploy and when.

This paper examines the support required by Air Mobility Command's airlift and air refueling assets under the Expeditionary concept. It focuses on the expected workload in deployment days for crews. The research compares current opstempo with the opstempo associated with past Air Expeditionary Force-type deployments and expected workload from the new concept. The results of the research depict a slight increase in opstempo under the Expeditionary concept but also discusses other possible reasons for the increase.

# EXAMINING AIR MOBILITY COMMAND SUPPORT TO THE EXPEDITIONARY AEROSPACE FORCE

## I. Overview

### Introduction

Since the end of the cold war, the Air Force has been continuously engaged in contingency operations. Threats to American security and interests can and have emerged from any point on the globe at any time. To counter these almost daily crises, the Air Force is creating a new organizational structure based on an expeditionary mindset that allows rapid and decisive response to potential crises. Expeditionary Aerospace Forces (EAF) can put the right kind of forces at the right time in response to humanitarian crisis providing relief supplies to direct combat operations employing decisive combat firepower. Trademarked lighter, leaner forces, trained in expeditionary operations and tailored to respond to the Warfighting Commander in Chief (CINC) requirements across the broad spectrum of crises, will deploy rapidly to execute the CINC's theater responsibility missions (Katzaman, 1998a, 1). Previously, these units were selected on an ad hoc basis creating a reactionary mindset that wreaked havoc on the personal lives of our forces. The EAF concept allows for stability in scheduling units by providing a fixed 15-month scheduling cycle. The term "EAF" refers to the concept that will bring these expeditionary forces to bear for worldwide support.

The success of EAF also depends on the vital contributions of the total force. The active duty forces, Air Force Reserves (AFRES), Air National Guard (ANG), and civilians will together form Air Expeditionary Forces (AEFs). Each AEF will provide a cross-section of combat, tactical airlift, tanker, and other support aircraft. These units will train together, as they would be fighting together and will deploy together as a team. The EAF concept calls for ten AEFs to be formed with an additional two Air Expeditionary Wings. These AEFs will be the core units that will make up the EAF and will deploy on a scheduled rotational basis. The two air expeditionary wings (AEWs) will be rapid-response wings used for unexpected "pop-up" world events. (Palmer, 1999:10)

#### **Description of the Problem**

The Air Force has a limited number of aircrews constantly deploying for short notice contingencies. Aggravating the situation has been the drawdown of two-thirds of the Air Force's manpower as contingency deployments has increased fourfold (Cook, 1999:1). As the Air Force has responded to these contingencies around the globe, units were selected on an ad hoc basis. Units experience high optempo, extended temporary duties (TDYs), and disrupted family lives. The EAF concept injects stability into the lives of the Air Force airmen by providing a predictable rotation schedule and allocating specific forces to each AEF.

AMC's challenge is to provide support to the EAF concept and maintain its daily mission support to its other customers without overtasking its people and equipment. Mobility Forces are operating at an already high level of operational taskings. AMC aircrews had flown over 200 missions supporting Operation ALLIED FORCE by early

April, with the contingency being only a few weeks old. (AMC/TACC, 1999b: 2). The Appendix lists the many operations AMC assets have participated in during the previous three years. AMC's support for the AEF deployments will aid in providing a more predictable requirement, but needs to account for the day to day high opstempo of the mobility forces and the surge requirements necessitated by moving the AEF deployments. Short AEF timelines, if bombs are to be on target in 48 hours, requires instant response by mobility forces to build the air bridge and move these necessary assets in place in advance of the combat air forces. This paper focuses on the expected workload in terms of deployment days and missions flown that AMC will shoulder as the EAF concept is implemented. The expected workload is compared to AMC's current workload in terms of TDY days crewmembers are gone. To determine AMC's support to the EAF, four questions are investigated: 1) What is AMC's current opstempo (measured in TDY days per crew)? This data is used as a starting point for the comparison. 2) AMC has supported previous AEF operations over the past few years. What amount of support was required by mobility tanker and intertheater airlift assets for these contingencies? 3) What is the expected workload for AMC's crews considering the support required by the EAF concept? 4) Will opstempo be increased over previous levels due to the EAF opstempo?

### **Scope/Definitions**

The EAF concept encompasses a comprehensive package of fighter, tanker, intratheater airlift, and reconnaissance aircraft tailored to meet contingency requirements for the supported CINC. It also includes the support needed for deployed base operations such as command and control, maintainers, security forces, and other base operations

support. This research focuses on only a small part of the overall package and the airlift support needed to deploy the AEF. The current tanker opstempo will be determined and compared to the expected future requirements needed for supporting an AEF deployment and employment. The paper will also look at the intertheater airlift required for moving the AEF into and out of the deployed locations required by specific, individual contingencies. Previously, the paper introduced certain terms that will be used throughout the document. To cut down on confusion and to ensure clarity, these terms will be defined here. *Opstempo* refers to the number of days a specific aircrew member will be away from his/her home unit. It will be broken down by each specific weapon system. *Intertheater* airlift refers to the airlift assets that will transit back and forth between the United States and the theater of operations carrying the support equipment needed by the AEF. This paper addresses only the C-17, C-5, and C-141 airframes. These assets are limited and in constant demand. The problem will be magnified as the C-141 reaches the end of its service life and is removed from the inventory. Approximately 266 C-141s will be replaced with only 120 C-17s (AMC/XP, 1997: 2). This makes every airlift aircraft even more important since there will be fewer aircraft left to do the ever increasing number of required airlift missions. The Civilian Reserve Air Fleet (CRAF) provides a large portion of airlift capacity, but is not examined in this paper. Because of its large lift capacity, (especially for passenger airlift), the CRAF should play a vital part of the EAF concept and could easily reduce the strain on the organic or Air Force owned airlift assets.

*Air refueling aircraft* or more commonly called, *tankers*, are the assets that will provide the air refueling support for the deployment and employment of the AEF aircraft.

They form the air refueling air bridge that provides aircraft fuel while airborne to the deploying AEF aircraft as they move into and out of the theater. In addition, they will be part of each of the ten AEFs that deploy into the theater of operations and will be providing air refueling to the other deployed assets as they are employed in the theater. These assets include the venerable KC-135 and the KC-10.

### **Assumptions/Limitations**

The EAF concept is still evolving and will continue to evolve up until the time it is implemented in 2000. The basic framework of the EAF concept that is used as the basis for this paper comes from the Air Force Chief of Staff's (CSAF) August 4<sup>th</sup> 1998 briefing which introduced the concept. The CSAF briefing specifies 10 AEFs each deploying on a 15-month cycle to handle any and all contingency operations. Another assumption includes the additional two AEW's which will be used for unexpected "short-notice" real world events (Palmer, 1999: 10). At the time of this research, unit sourcing and equipment requirements were not finalized for the ten AEFs. This left the task of determining the opstempo for intertheater airlift and tankers difficult. The opstempo is determined from research data based on historical events (AMC/DOR, 1999: 1-4). AMC has been participating in AEF or AEF-like missions for the past few years. Each of these missions has varied in size and urgency. Since the EAF concept is based on flexibility and tailored response packages, the previous AEF type deployments will serve as a close approximation of future responses.

### **Overview of Subsequent Chapters**

Chapter II provides a background of the EAF concept. It examines where the EAF concept originated and provides a quick look at the current opstempo picture. It then

follows a strategy to task methodology that provides the linkage between the National Security Strategy, National Military Strategy down through the Air Force vision, *Global Engagement*, to the EAF concept. This linkage is important since our mission and how it is accomplished is based on these policies.

Chapter III determines the current opstempo for the airlift and tanker aircraft. It depicts the current TDY statistics for each weapon system and explains what type of operations produced the data. The chapter examines data from the Phoenix Scorpion deployments of AEFs to Southwest Asia from 1997 to 1999. The data provides the amount of TDY days associated with each Phoenix Scorpion deployment.

Chapter IV examines the support required by the EAF concept and calculates the expected TDY days for each specific crew position.

Chapter V provides an interpretation of the data and offers some suggestions to lessen the burden on an already busy mobility force. It also suggests areas for further study. As the EAF develops, more specific data on individual units will become available and can be used in modeling future deployments.

## **II. Background**

### **Overview of the EAF Concept**

On the 4<sup>th</sup> of August 1998, Acting Secretary of the Air Force, the Honorable F. Whitten Peters and Air Force Chief of Staff, General Michael Ryan announced the EAF concept, setting the wheels in motion for a January 1<sup>st</sup> 2000 rollout. The Air Force has undergone a major transition in the types of missions it is called on to perform and the frequency of its taskings. Its forces are engaged every day around the world, in operations ranging from combat power projection to humanitarian relief (Ryan, 1998: 1). The Air Force supports operations such as NORTHERN and SOUTHERN WATCH in Iraq that provide relief to the Kurds and imposition of the no-fly zones. It also reacts to natural disasters such as Hurricane Mitch by providing relief supplies.

Top Air Force leadership announced the EAF concept as the next logical step in organizing and training Air Force units to respond to the ever increasing number of contingencies. The plan calls for linking geographically separated units, operational wings, groups, and squadrons, from the active, ANG and AFRES forces. These forces will be designated AEFs and will include a cross-section of the Air Force's weapon systems including fighters, bombers, tankers, and airlift aircraft. Table 1 depicts the notional AEF force composition (Peters, 1998: 14). The capabilities included in each AEF range from air-to-air fighter assets to Combat Search and Rescue (CSAR) to air refueling to intra-theater airlift. Although not necessarily identified, the high demand,



low-density assets such as AWACS and other surveillance assets can be tasked as required.

**Table 1. Notional AEF Force Composition (Peters, 1998: 3)**

<i>Forward Deployed</i>	<i>Capabilities</i>	<i>On Call</i>
18 x F-15C	Air-to-Air	6
10 x F-15E	PGM	14
8 x F-16CJ	SEAD	10
12 x A-10 (6 Units)	Anti-Armor/CAS	14 (ANG)*
3 x E-3	Surveillance/C2	0
3 x HH-60	CSAR	9
8 x C-130 (2 Units)	Intra-Theater	10 (ANG)*
4 x KC-10	Air Refueling	2
3 x KC-135 (2 Units)	Air Refueling	7 (AFRC)*
3 x KC-135 (2 Units)	Air Refueling	7 (ANG)*
3 x C-21A	Transportation	6
0 x B-52/B-1	CALCM/SA	6
0 x B-2	Stealth	3
0 x F-117	Stealth	6
<hr/>		
<b>75</b>	<b>175 Total</b>	<b>100</b>
<hr/>		
<b>High Demand/Low Density Assets Tasked A/R</b> E-3, E-8, U-2, EC-130, RC-135, CSAR, Ground Systems (GTACS)		* Additional aircraft may be available with Presidential Selective Reserve Call-up

There are not enough of these vital assets to be assigned to every AEF. The table also depicts both the forward-deployed piece and an on-call piece if more assets should be needed. The total package will provide a light and lethal mix of capabilities for supporting any on-going and future contingency.

The AEFs will be tied together by an integrated command and control system headed by an Expeditionary "lead wing." (Air Force News, 1999a, 2) The plan calls for ten AEF packages consisting of the assets from table 1. These AEFs will be supplemented by two rapid-response Air Expeditionary Wings (AEWs) that provide additional capability for unexpected "pop-up" world events. The concept calls for the

AEFs to handle the current ongoing contingencies while the AEWs provide that on-call capability to deploy to the newest hot spots around the world. Figure 1 shows the deployment rotation cycle for the AEFs and AEWs.

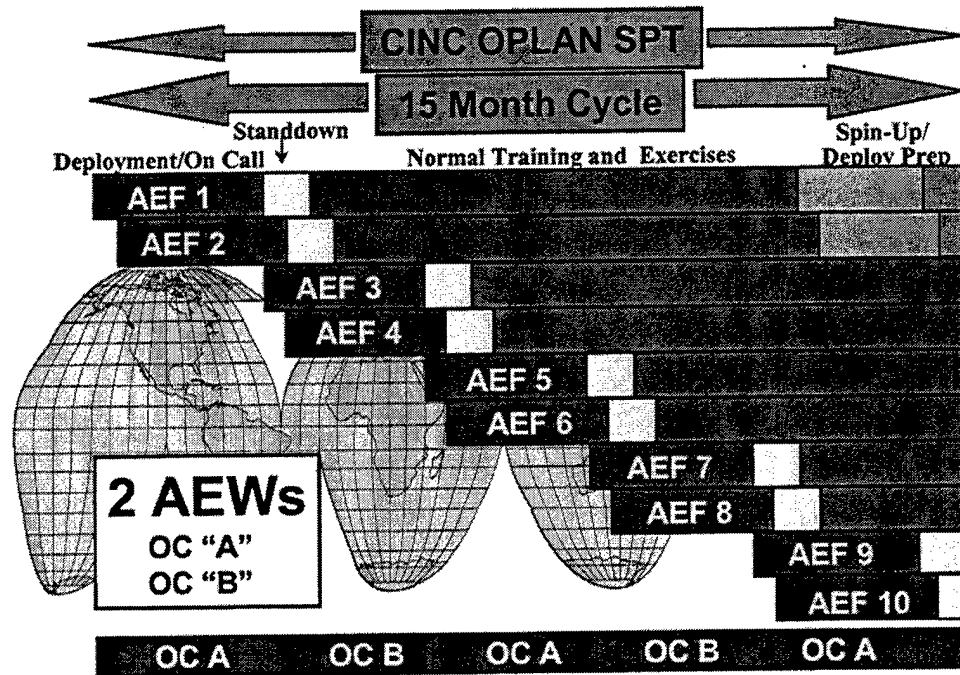
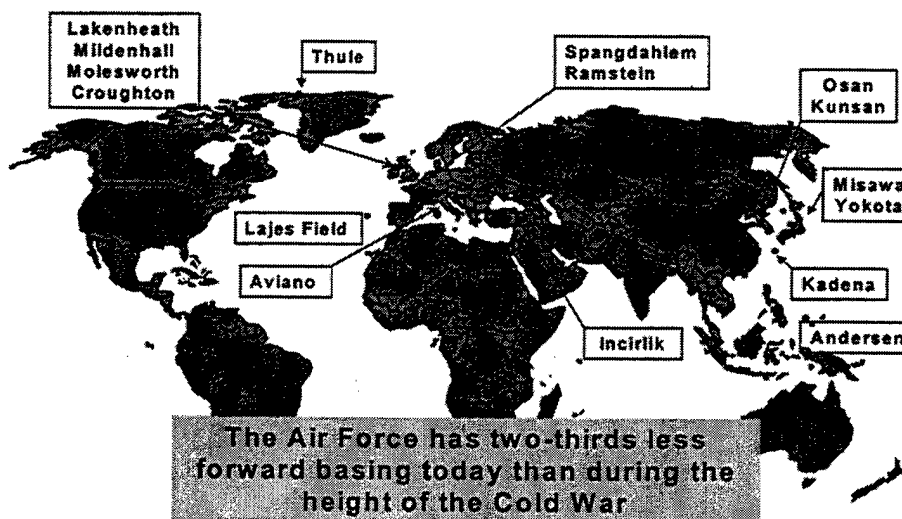


Figure 1. AEF Rotational Cycle

The AEFs will rotate on a 15-month cycle with two AEFs in the deployment/on-call phase at one time. Within the 15-month cycle, each AEF can expect to be deployed up to 90 days. With each deployment, AMC intertheater airlift is needed to move the deploying assets to the area of operations. At the same time, AMC will be redeploying the previous AEF assets back to their home base. This airlift requirement will be needed every 90 days and could take as much as three weeks to complete the move (AF/XOPE, 1999: 5). Prior to the deployment phase, the units will have a two-month spin up or preparation phase. This time will be used for integrated training, training, as they will

deploy and fight. The training will concentrate on preparing the airmen for operating in the specific area of the deployment. After the redeployment, the units will have a two-week "spin-down" period, which includes time for a "Hotwash" of activities of the deployed operations. The two AEWs are depicted on the bottom of the chart and can also expect to deploy for up to 90 days in the 15-month cycle like their AEF counterparts.

The EAF concept provides force that is light, lean and lethal that puts the right force in the right place at the right time. Light is important because the forces will rely on global airlift to get to the fight. U.S. forces are mostly based in the continental United States. The number of overseas bases have declined by two-thirds from the height of the Cold War requiring lengthy deployments to maintain our commitments (figure 2).

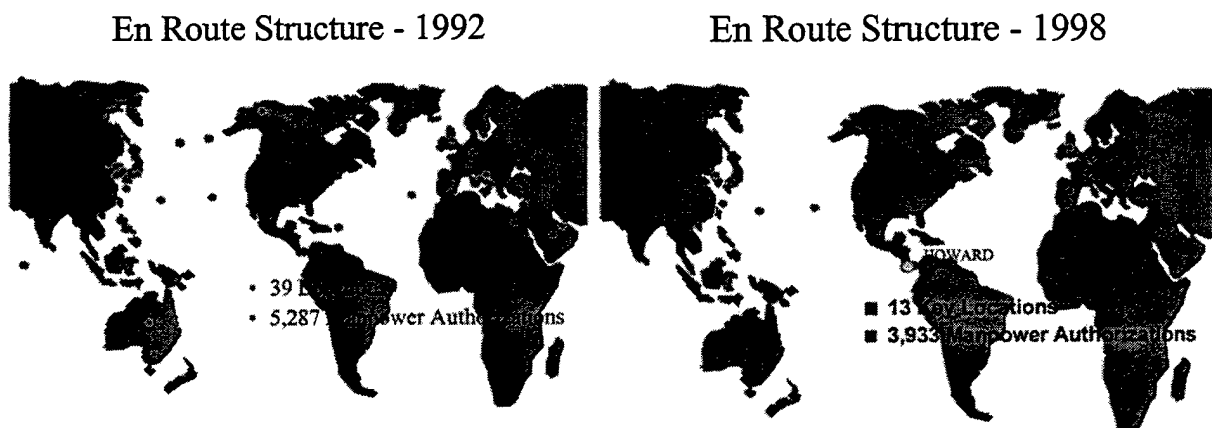


**Figure 2. Overseas Basing**

Whenever a conflict arises, the AEFs will need to rapidly deploy from their home bases to where they are needed. Airlift forces provides that rapid mobility with tankers supplying fuel through the air-bridge concept to get the airlifters to the theater. However,

both resources are limited. The light forces keep the airlift system from being overwhelmed during rapid-response contingencies. They will deploy only with what is initially required and will rely on strategic resupply to sustain the fight. Another possible cause of concern for the mobility forces is the amount of enroute bases available to sustain mobility operations. Figure 3 shows that prior to 1996, there were 39 enroute locations compared to only 13 key locations today (AMC/XP, 1997: 4-16).

The enroute system is a dynamic global network comprised of people, equipment, and infrastructure. The system is designed to support the worldwide operations of the



**Figure 3. Enroute Force Structure**

mobility forces. These locations serve as the peacetime waystations for mobility aircraft and crews as they carry out the global mobility mission (AMC/XP, 1997, 4-17). During times of increased operations, the Global Reach Laydown (GRL) system supplements the enroute system. GRL rapidly deploys additional people and equipment to operate any bare base worldwide to support mobility operations (AMC/XP, 1997: 4-77).

Another advantage of the EAF concept is what it does for the deploying airman. Gen Ryan stated: "Our forces have been overextended for several years because of a reduction in manpower as contingency deployments increased fourfold." (Peters, 1998: 5) This has caused a dramatic increase in the number of Temporary Duty (TDY) or time away from home and families for our airmen. The deployments have been especially hard on the tanker crews. Their crews transitioned from a stay home force pulling alert duty to a short notice deployment asset. This change has driven TDY rates near and at times above 120 days per year, a goal set for the maximum desired days away from home. Table 2 provides an example of current TDY rates. It depicts a running total of TDY days over the past twelve months as of January 1999 for KC-135 pilots. The rates range from 95.6 TDY days to 122.5 TDY days (AMC/DOTF, 1999: 1). Even worse, copilot and navigator TDY totals have topped out above that mark. The increased TDY rates have been felt not only by our tanker forces, but also by every weapon system in the Air Force inventory, including fighters, airlifters, etc. Each weapon system is experiencing more TDY days away from home--disrupting family lives and producing alarming pilot retention rates. Retention rates refer to the number of pilots that elect to stay on active duty after serving out their active duty service commitments to the Air Force. Retention rates have been on the decline for the past few years and are predicted to continue to slide. This effects the readiness of our force by not having enough pilots to fill all of our cockpits. The strong economy has the airlines hiring away pilots looking for a more predictable and profitable lifestyle (AMC/DP, 1999: 3).

**Table 2. KC-135 Crewmember TDY Days**

<b>Base (UNIT)</b>	<b>Pilot</b>	<b>Copilot</b>	<b>Navigator</b>	<b>Boom Operator</b>
Fairchild (92 ARW)	99.4	122.9	102.6	100.2
Grand Forks (319 ARW)	122.5	123.8	112.5	106.0
MacDill (6 ARW)	95.6	97.1	108.5	98.2
McConnell (22 ARW)	108.9	136.8	113.2	88.1
Robins (19 ARG)	121.7	154.4	122.1	111.8
Weighted Average	109.6	124.9	110.0	97.2

The EAF concept is aimed at stabilizing the opstempo for our Air Force airmen. It does this by producing a predictable schedule that provides airmen advance notice of the next deployment. It also attempts to reduce opstempo by facilitating better integration of Air National Guard and Reserve Forces into contingency deployments (Peters, 1998: 8). The Air Force can not compete on a money basis with the airlines, but through an attempt to stabilize the lives of its members, it hopes to slow the exodus of skilled people.

The EAF concept also provides a capability for the warfighting CINC. Gen Ryan stated:

What's in it for the CINC's? They get trained to the task, robust forces --not ones that we ad hoc and put forward. They get rapid response forces that are tailored to meet the kind of contingencies they have, or if it is a contingency that they have not predicted, they have forces that are on the bubble and ready to go. It gives them full spectrum capability we think will fit nicely into ops plans.

The CINC receives a fighting force tailored to their requirements. The forces train together, as they would be fighting as opposed to the forces coming together for the first time in the theater. The expeditionary nature of the forces means the forces can react quickly to any situation that may arise. It also provides for a smaller footprint required in theater by demonstrating the speed of reaction if more forces are needed quickly.

### **Building a Case for EAF**

Several high level documents are key to shaping the way the Air Force applies its military might. These documents include the National Security Strategy, National Military Strategy, Joint Visions 2010, and other vision and doctrine documents. The technique used to examine these documents is strategy to task. It first looks at the strategies provided by the President and the Chairman of the Joint Chiefs of Staff and determines the tasks required of the Air Force to achieve these strategies. Strategy to task methodology then attempts to determine the linkages between these high level documents and the tasks or missions of the Air Force. The linkage provides a justification for continuing a particular mission or moving toward other missions. Before pursuing the EAF concept, a quick review of these higher level documents can determine if the EAF concept is appropriate given the guidance contained in those documents.

The National Security Strategy for A New Century calls for the Imperative of Engagement (Office of the President, 1997: 3). Its approach relies on being prepared and willing to use all appropriate instruments of national power to influence the actions of other states. We also must have demonstrated will and capabilities to continue to exert global leadership. Engagement relies on three approaches to achieve its imperative. The first approach is to *Shape* the international environment. The United States has many

tools available to shape this environment such as diplomacy, international assistance, military activities, and others. Of these, military activities play an essential role. Deterrence of aggression and coercion on a daily basis plays a big part in shaping the environment. The EAF provides deterrence by projecting power rapidly anywhere around the globe. The second approach is to *Respond* to the full spectrum of crisis. Response can come in the form of diplomacy, economic, law enforcement, or military. The last approach is to *Prepare* today for an uncertain future. Key to this area is the need to foster innovation in new operational concepts, capabilities, technologies, and organizational structures, like the EAF. It also entails modernizing our forces to continue carrying out these tasks.

The National Security Strategy is the beginning of the chain that shapes our military. The *Shape*, *Respond*, and *Prepare* approaches are a catalyst for the EAF concept. As the Air Force downsized, the requirements of *Shape*, *Respond*, and *Prepare* remain valid. The EAF concept provides the required capabilities while balancing the higher opstempo of today.

The National Military Strategy is the how of the National Security Strategy. It describes the objectives, concepts, tasks, and capabilities necessary in achieving *Shape*, *Respond*, and *Prepare* (Department of Defense, 1997a: 1). It defines the military's first and foremost task as fighting and winning our nation's wars. To accomplish this task, the National Military Strategy describes four strategic concepts, which further define today's Air Force missions. The first concept is *Strategic Agility* or the timely concentration, employment, and sustainment of US military power anywhere, at our own initiative, and at a pace our adversaries can't match. As defined, the EAF provides this agility by



putting a lethal force anywhere with minimal notice in a short period of time. The next strategic concept is *Overseas Presence*. With permanently stationed forces declining overseas, the U.S. presence is now felt as we respond to crisis after crisis. Wherever there maybe a conflict or humanitarian relief needed, U.S. aircraft are in the background providing the needed capabilities. The third concept is *Power Projection*, being able to rapidly and effectively deploy and sustain military power. As stated previously, the EAF provides a rapid deploying force, tailored to the situation and capable of providing *Decisive Force*, the final strategic concept. *Decisive Force* is the commitment of sufficient military force to overwhelm any adversary. The National Military Strategy states that the four strategic concepts emphasize that the military needs to be able to employ the right mix of forces and capabilities to provide the decisive advantage in any operation. Again, the National Military Strategy, like the National Security Strategy describes those capabilities of rapid, tailored forces able to provide lethal combat power, as the EAF is capable of delivering.

The next two documents reviewed are Joint Vision 2010 and Global Engagement. These documents differ from the first two strategy documents in that they provide the vision of where the military wants to be and how to achieve it. They rely on the strategy documents to determine where to put their emphasis and use this information to project their vision for the future. They encompass the ideas of where the military is and where it needs to go.

Joint Vision 2010 details the plan for developing an effective joint warfighting capability. To do this, Joint Vision 2010 developed four operational concepts: *Dominant Maneuver*, *Precision Engagement*, *Full-Dimensional Protection*, and *Focused Logistics*

(Department of Defense, 1997b: 1). These operational concepts further whittle away at the direction given in the National Security Strategy and National Military Strategy and provide more succinct guidance on the “how” of the strategies. *Dominant Maneuver* is the multidimensional application of information, engagement, and mobility capabilities to position and employ widely dispersed joint air, land, sea, and space forces to accomplish the assigned operational tasks. *Precision Engagement* provides the capability for our forces to locate the objective or target, target it, determine our success, and reengage if necessary. *Full-dimensional Protection* protects our forces from the same technologies that we are exploiting. This is done by controlling the battlespace and providing multi-layered defenses for our forces and facilities at all levels. This ensures our forces can have the freedom of movement during deployment, maneuver, and engagement. *Focused logistics* is the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical levels of operations. Each of these operational concepts provides more of how the military will *Shape* the international environment, *Respond* to crisis, and *Prepare* for the uncertain future.

As we modernize our forces and adapt new concepts such as the EAF, each force is guided by the operational concepts of Joint Vision 2010 and the strategies of the president and Joint Chiefs of Staff. The Air Force’s Global Engagement takes the above guidance and vision and translates it into the future vision for the Air Force. From this, concepts such as the EAF are developed and justified. Global Engagement defines this guidance through its six core competencies: *Air and Space Superiority*, *Global Attack*,

*Rapid Global Mobility, Precision Engagement, Information Superiority, and Agile Combat Support* (Department of the Air Force, 1997: 6). These six core competencies further define how the Air Force will accomplish Joint Vision 2010's operational concepts (Air Force News, 1999b: 2). *Air and Space Superiority* provides the Air Force piece to *Full-Dimensional Protection* by clearing the air space of enemy forces ensuring freedom of action and movement. *Global Mobility* enables both *Dominant Maneuver* and *Focused Logistics* by putting forces where they need to be quickly and sustaining them during the fight. *Global Attack* provides the ability to rapidly attack any adversary anywhere on the globe at any time. *Global Engagement* introduces the AEF as the enabler to meet the demands of *Global Attack* and meet the needed capabilities espoused in Joint Vision 2010.

The above review of both national level strategy documents and military vision documents reveals the trickle down effect of how the separate services interpret and develop the operational concepts. The services build individual capabilities that compliment those capabilities of the other services that when combined produce synergistic effects. The EAF concept takes the ideals of *Shape, Respond, and Prepare*, considers the operational concepts of Joint Vision 2010 and Global Engagement and forms an enabler to accomplish the mandates of the National Security Strategy and National Military Strategy.

### **III. Current Concept of Operations**

#### **Overview**

The purpose of this chapter is to determine the current opstempo of the airlift and tanker forces. It will be used as a base line for comparison against the future expected opstempo associated with the EAF Concept. An examination of past AEF-type operations is made to predict possible future scenarios and requirements of the EAF Concept. This data can then be used to determine what, if any effects that the EAF Concept has toward reducing opstempo.

Opstempo and force readiness are hot topics these days as our smaller forces are called away more often to support humanitarian and even combat operations. Defense Secretary William Cohen and General Hugh Shelton, Chairman of the Joint Chiefs of Staff, recently stressed that readiness is fraying and that they expressed concern that it is not allowed to become a "tear" (Garamone, 1998:1-3). Each has testified before Congress on readiness issues and the effect of the current high opstempo.

The number of assets deployed overseas has grown also. After Desert Storm, tanker aircraft and support have continually been deployed to the Southwest Asian Theater supporting Operations NORTHERN AND SOUTHERN WATCH. These operations combined with constant "pop-up" contingencies have driven up opstempo which in turn affect the readiness of our forces and the retention of experienced and skilled people. To counter the quick reaction contingencies, the Air Force has been organizing its deployments in an expeditionary manner. Forces are placed on call, then



only been going on for a few short weeks and has required a majority of the available assets for support. The constant in each operation is that tanker and airlift support is critical to the mission's success.

Presently, deployments to the Southwest Asia supporting NORTHERN and SOUTHERN WATCH account for the majority of deployed tankers. A total of 19 KC-135s and 4 KC-10s are deployed to support both operations. This has been a constant requirement since the end of the Gulf War although the number of tankers required has changed from time to time in response to the variability of the Iraqi threat. When the tankers deploy, they are manned at a higher crew ratio than the number of airplanes deployed. The deployment to Southwest Asia takes 19 KC-135s and approximately 29 crews. With crews being deployed for 45 days at a time, the number of TDY days increases quickly. Table 3 breaks down the number of tanker aircraft deployed for ongoing contingencies. The EAF will cover these contingencies when it is implemented.

**Table 3: Tanker Deployments (adapted from AMC/TACC, 1999b: 3)**

<b>Location</b>	<b>Operation</b>	<b>Aircraft</b>	<b>Aircraft Deployed</b>
Keflavik	-	KC-135	1
Geilenkirchen	-	KC-135	2
Incirlik	Northern Watch	KC-135	7
Istres	Joint Forge	KC-135	6
Al Dhafra	Southern Watch	KC-10	4
Al Kharj	Southern Watch	KC-135	12

The number of TDY days associated with the deployments in Table 3 is determined by multiplying the number of crews deployed in the theater by the number of

days each deployment lasts. The resulting number is divided by the number of crews available to each weapon system, giving TDY days for the deployment. Normally, the deployments last for approximately 45 days as individual units swap out airplanes and crews. The Southwest Asia deployments alone add approximately 43 TDY days for tanker crews for the year. This accounts for only a small portion of the total TDY days for the tanker crews, but is significant in the comparison against future TDY days associated with EAF.

Total TDY days are tracked by Air Mobility Command's Aircrew Training and Resources Division (AMC/DOTF) and are broken down by weapon system. They provide a monthly count and twelve-month rolling window count of TDY days. Table 4 summarizes TDY days for airlift and tanker crews (AMC/DOTF, 1999: 1). The table reflects the weighted average of TDY days over the past twelve months from all of the wings possessing the specific weapon system.

**Table 4: Tanker and Airlift TDY Days (as of Mar 99)**

<b>Weapon System</b>	<b>Pilot</b>	<b>Copilot</b>	<b>Navigator</b>	<b>Flight Engineer</b>	<b>Boom Operator/ Flight Engineer</b>
C-5	89.6	112.5	61.7	88.9	93.8
C-141	102.5	132.4	72.6	93.4	100.8
C-17	104.8	124.0	NA	NA	114.9
KC-135	108.1	123.2	108.7	NA	95.6
KC-10	108.2	117.2	NA	108.3	113.1

Table 5 depicts the TDY days for each of the weapon system line crews covering the time period of only one-month (AMC/DOTF, 1999: 1). This table provides the

current opstempo data for the listed mobility assets that will also be used for comparison with the rates for past AEF operations.

**Table 5. Tanker and Airlift TDY Days (as of Mar 99)**

<b>Weapon System</b>	<b>Pilot</b>	<b>Copilot</b>	<b>Navigator</b>	<b>Flight Engineer</b>	<b>Boom Operator/ Flight Engineer</b>
C-5	8.1	10.5	10.0	8.5	7.9
C-141	7.1	9.1	7.0	8.9	8.2
C-17	8.1	9.5	NA	NA	9.5
KC-135	12.3	13.2	14.9	NA	12.4
KC-10	9.0	10.7	NA	10.0	8.1

### **Past AEF Operations**

This section analyzes data collected from past AEF-type deployments. Phoenix Scorpions I thru IV deployed expeditionary forces to support Southwest Asia requirements. Each Phoenix Scorpion AEF deployment is analyzed to determine the amount of support given by the airlift forces. Tanker data is available, but only depicts those missions flown in support of the deployment. Tankers provide support during deployment, but also deploy forward providing employment support to the AEF while they are in the theater. The effect of the deployment on TDY days is not as large as compared to the effect caused when aircrews stay in theater to support employment activities. A better measure is provided in the preceding section, which shows the amount of tankers deployed to Southwest Asia and the length of time each tanker remains in the theater. For the airlift forces, the methodology used in determining opstempo is to



analyze the mission data for each deployment separately. The data is broken down into the number of missions required for each deployment. The data also contains the number of fighter and bomber aircraft that were deployed. This information will be compared to the amount of aircraft that could deploy under the EAF concept. Another reason that the Phoenix Scorpion deployments are important in the comparison is that each deployment was of varying sizes and time constraints, which provides another approximation of possible future EAF deployments.

The TDY days are calculated based on the number of missions flown for the deployment period divided by the total number of crews available to each weapon system. Since the EAF concept is based on the Total Force, active, ANG and AFRES forces, the data reflects the amount of crews based on Total Force crew authorizations as well as AMC crew authorizations. The available Phoenix Scorpion data is not broken out by the origin of the crews. Using only Total Force data skews the data since the missions are not flown proportionally to the amount of assets each component, active, ANG, and AFRES forces, has assigned to them. Using only AMC crew data would also be inaccurate since the ANG and AFRES crews provide vital support on a daily basis. Mission data and TDY days are summarized in tables 7 and 8 respectively.

Phoenix Scorpion I was the second largest of the Scorpion deployments with 758 total sorties flown by mobility forces (includes tanker sorties). The AEF was deployed to Bahrain at the request of the commander in chief of US Central Command (Air Force News, 1997: 1). The AEF was designated the 347<sup>th</sup> Air Expeditionary wing. It consisted of 12 F-15Cs from Eglin AFB, 12 F-16Cs from Moody AFB, six F-16C/Js from Shaw AFB, and two B-1s from Ellsworth AFB (Air Force News, 1997: 1). The deployment

was a short notice deployment and lasted for approximately 28 days. During the deployment, airlift support consisted of the following: 248 missions flown by C-5 crews, 48 missions flown by C-17 crews, and 128 missions flown by C-141 crews. The following tables show the amount of additional TDY days Phoenix Scorpion I added to the airlift and tanker opstempo. The TDY days are broken out by Total Force, which includes the active, ANG, and AFRES crew forces. The second table shows the additional TDY days based on using AMC crews only.

**Table 6. Phoenix Scorpion I TDY Days - Total Force**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion I	0.80	0.32	0.28	0.27	0.39

**Table 7. Phoenix Scorpion I TDY Days - AMC Crews**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion I	2.15	0.53	0.75	0.82	0.69

Phoenix Scorpion II was the largest deployment in relation to airlift missions flown. Approximately 2006 missions were flown (including 256 KC-135 missions and 52 KC-10 missions). The deployment consisted of six F-16s from Shaw AFB, six B-52s from Barksdale AFB, two B-1s from Ellsworth AFB, and 10 F-117s from Holloman AFB. C-5 crews flew 873 airlift missions. C-17 crews flew 209 airlift missions, and C-141 crews flew 357 airlift missions supporting this deployment. In addition to moving AF assets, the mission count included moving a division-ready brigade from Hunter AAF. This added to the large number of missions that were not attributed to the AEF

deployment. It does show that in addition to moving the AEF quickly, there can be many other customers such as the Army that needs to be moved at the same time.

**Table 8. Phoenix Scorpion II TDY Days - Total Force**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion II	2.81	1.39	0.79	0.36	0.28

**Table 9. Phoenix Scorpion II TDY Days - AMC Crews**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion II	7.58	2.32	2.09	1.08	0.48

Phoenix Scorpion III was a larger deployment in relation to the amount of fighter and bomber aircraft moved, but consisted of only 438 mobility missions flown, of which only eight were flown by KC-135s. The mobility forces deployed a force of 12 F-16C/Js, 12 F-15Cs and Ds, 12 F-16s, and six B-1s (Air Force News, 1998b:1). No reason was given why fewer numbers of airlift missions were flown. Possible reasons could be that as the Air Force gets better at AEF type operations, they become confident that they do not need to take as much equipment initially. The concept calls for sustaining operations for seven days, then resupply will begin. Another possible reason that fewer airlift missions were flown is that the equipment needed by the fighter and bomber aircraft may have already been in-place and less had to be moved. C-5 crews flew 181 airlift missions. C-17 crews flew 97 airlift missions, and C-141 crews flew 131 airlift missions.

**Table 10. Phoenix Scorpion III TDY Days - Total Force**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion III	0.58	0.65	0.29	0.01	0.00

**Table 11. Phoenix Scorpion III TDY Days - AMC Crews**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion III	1.57	1.08	0.77	0.03	0

The last AEF deployment was Phoenix Scorpion IV. This deployment consisted of 10 F-15Cs from Langley AFB, 15 F-16C/Js from Shaw AFB, 10 F-16s from Hill AFB, and 10 F-117s from Holloman AFB (Air Force News, 1998a: 1). This deployment required 157 airlift missions from C-5 crews, 153 airlift missions from C-17 crews, and 159 airlift missions from C-141 crews.

**Table 12. Phoenix Scorpion IV TDY Days - Total Force**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion IV	0.51	1.02	0.35	0.04	0.14

**Table 13. Phoenix Scorpion IV TDY Days - AMC Crews**

Deployment	C-5	C-17	C-141	KC-135	KC-10
Phoenix Scorpion III	1.36	1.7	0.93	0.12	0.25

## Summary

The TDY day calculations show a relatively small increase in the amount TDY crews experience in response to the EAF concept. Even the most intense deployment,

Phoenix Scorpion II added two to three days at the most to the count of Total Force TDY days. To achieve a more accurate measure, missions should be tracked as a proportion of those flown by each component. Current mission data does not reflect missions flown by each component. More important than the TDY day calculations is the effect that surge operations, or how quick the AEF must deploy will have on the crews. For example, Phoenix Scorpion I shows 248 missions flown by C-5 crews in only 28 days. TDY calculation data divides the total number of missions by the total number of crews. In real time operations, only a fraction of crews will be flying those missions while the other crews will be continuing normal peacetime missions. These issues are discussed further in Chapter five.

## **IV. Future Concept of Operations**

### **Assets Required**

This section examines the notional force structure of the EAF concept and the past AEF-type operations. A comparison is made of the assets actually used during the AEFs, those assets that are required for ongoing contingencies, and the assets involved in the EAF concept. From Table 1, a notional AEF under the EAF concept has six KC-135s and four KC-10s forward deployed with another 14 KC-135s from the Air National Guard and Air Force Reserve and 2 KC-10s on call. Also recall that during the 15-month EAF rotational cycle, two AEFs, each with the same force structure would be available to deploy. In addition, one of two expeditionary wings would be on call for "pop-up" contingencies. Each AEF could consist of about 175 aircraft.

The Mobility Air Forces included in the AEFs are mainly comprised of tanker aircraft, KC-135s and KC-10s. C-130 intratheater airlift is included in the AEF. The tanker aircraft are used for both the deployment/redeployment of the AEF and also become part of the AEF that remains in the theater. These aircraft would provide air refueling support to the combat arm of the AEF while employed in theater. The intertheater airlift, C-5s, C-17s, and C-141s, is not designated as part of an individual AEF, but would be tasked with each deployment and redeployment. The intertheater airlift would not remain deployed in the theater with an AEF, but would cycle through with crews swapping out throughout the movement of forces.

## **Opstempo Findings**

The first area analyzed is the tanker aircraft. Tanker aircraft are currently deployed throughout the world. The largest contingencies for tanker support, which is also the longest running contingency, are Operations SOUTHERN and NORTHERN WATCH. 19 KC-135s and four KC-10s are deployed in support of these operations (AMC/TACC, 1999a, 3). This adds approximately 43 TDY days per year for the KC-135 crews. There are also six KC-135s deployed to Istres, France in support of Operation JOINT FORGE. The Air National Guard and Air Force Reserves have primarily run this operation, which adds about 7 TDY days per crew for the year. Two other standing commitments include two KC-135 aircraft deployed to Geilenkirchen and one KC-135 to Keflavik, which are also served by the ANG and AFRES (AMC/TACC, 1999a: 3). These deployments add about four days per year in TDY. KC-10 aircraft also have a semi-permanent deployment in support of Operation SOUTHERN WATCH (AMC TACC, 1999a: 3). The four KC-10 aircraft deployed to Al Dhafra adds about 15 TDY days per year for the crews.

The notional AEF force structure should not effect the nature of the support currently being provided. It is assumed that the same amount of tankers would be required for these contingencies unless hostilities increase or cease altogether. Since the AEFs would be deploying every 90 days, four deployments and four associated redeployments would occur each year. Given that on average, each deployment would add approximately one half day per year to tanker TDY days, four TDY days per year would be added to KC-135 and KC-10 crew's count. Total TDY days for KC-135 crews due to Southwest Asia support would go from 43 days to 47 days per year while KC-10

Southwest Asia TDY days would increase to 19 days per year. Another aspect to consider concerning tanker TDY days is that the rotation cycle for the AEF is based on fifteen months. Once deployed on an AEF, a unit would not be on the deployment hook again for another 15 months thus possibly lowering their TDY day count.

The airlift portion of this analysis is slightly more difficult to determine. The nature of the deployment will determine how much airlift is required. Of the four Phoenix Scorpion AEF deployments, Phoenix Scorpion IV moved the most fighter assets, 45 aircraft. Even so, this deployment was equivalent to moving only a portion of one notional AEF. Phoenix Scorpion IV added one-half TDY day to C-5 crews, one TDY day to C-17 crews, and about one-fourth TDY day to C-141 crews. Using the same logic as the tankers, there would be four deployments and four redeployments per year.

Considering the worst case of only having AMC crews available to move the AEFs, C-5 crews would add a total of 10 TDY days to their yearly totals. C-17s would add 13 TDY days, and C-141 crews would add seven TDY days per year. In any case, total TDY days (from table 5) for any of the airlift weapon systems would not exceed the 120-day limit per year for crews. Care must be taken with these results. Current commitment rates for airlift aircraft remain high. Any airlift not committed to the AEF would not be 'set on the shelf' for the next deployment. These aircraft will most likely be used to service other lower priority customers whose requests would otherwise be turned down.



## **V. Recommendations and Conclusions**

### **Research Paper Findings Summary**

The primary purpose of this research paper is to examine the EAF concept to determine if its precepts lead to an increase in opstempo for the mobility forces. The EAF's main goals are to better organize and employ the Air Force's limited air assets in response to multiple contingencies. In return, the EAF allows for greater stability and predictability for the Air Force people and their families. Responding to the many short notice contingencies by assigning forces in an ad hoc manner left Air Force people constantly on the road regardless of any family plans they may have made. By providing stability and forward planning in its scheduling of deployments, the Air Force can take better advantage of the contributions of the Total Force, the active duty, Air Force Reservists, Air National Guardsmen, and civilians (Peters, 1998: 2).

The EAF also provides the warfighting CINCs a force that can rapidly respond to any hot spot around the globe. The forces that deploy together will have had the opportunity to train together with an integrated command and control system provided by the lead wing, just like they would be fighting with together in the CINC's area of operations. The deploying forces can be specifically tailored to the contingency they will support, which makes them lighter, leaner, and more lethal (Peters, 1998:2). Therefore, the EAF provides a better life for Air Force people while providing better-prepared and tailored forces for the warfighting CINCs.

An integral part of the EAF concept is the Mobility Air Forces. The intertheater airlift, C-5s, C-17s, and C-141s, provide the majority of the cargo carrying capacity for

rapidly moving the individual AEFs into and out of the theater of operations. However, the airlift assets are used at a continuous high rate. Complicating the issue is the replacement of approximately 266 C-141s with only 120 C-17s (AMC/XP, 1997: 2).

The main focus of this research is to determine what the effect of the EAF will be on the Mobility Air Forces. The first step involved determining the current opstempo for the assets involved. Air Mobility Command's Aircrew Training and Resources Division (AMC/DOTF) continuously tracks TDY days for each weapon system. The airlift aircrews and KC-10 aircrews tend to be TDY around seven to nine days per month while KC-135 crews are gone around 12 days a month. The 12-month rolling window of TDY days shows crews were gone just over 100 days with tanker crews averaging 110 days.

The next step was to determine the number of days crews were TDY while supporting previous AEF-type missions. The Phoenix Scorpion missions were chosen for the study because of the varying amount of assets deployed and the different timelines associated with each. Phoenix Scorpion I, III, and IV were similar in the amount of mobility support in TDY days. Two measures of TDY days were used. One measure based the amount of available crews on the Total Force that includes active, ANG, and AFRES forces. The second measure based the available crews on amount of AMC-only authorized crews. Total Force provides more crews, but realistically would not be able to provide all of the available crews at once. AMC-only crews provide a measure based on a smaller crew force, however, during actual contingency responses, a mix of active and ANG/AFRES crews would be used.

Phoenix Scorpion mission counts show C-5 crews were the busiest, adding one to three TDY days for the crews for each deployment. The remainder of the mobility assets

was used at a rate that added as little as one-quarter day to approximately one day to their crew's TDY count. Phoenix Scorpion II was the largest deployment in relation to the amount of missions flown, but moved fewer fighter and bomber assets than the other three deployments. The deployment does highlight the fact that when an AEF needs to rapidly deploy, other mobility customers may need to move just as quick in response to the same contingency. During Phoenix Scorpion II, mobility forces also moved a cut and tailored Division Ready Brigade from Hunter AAF at the same time.

Tanker support doesn't end after the deployment. They provide operational support to the combat forces while being deployed to the theater. TDY days were determined by the assets that are currently deployed and how long they remained in the theater. On average, KC-135 crews add 43 TDY days per year for Southwest Asia deployments while KC-10 crews add about 15 TDY days. This figure would probably not change as the same amount of support will be needed regardless of how the forces are organized, EAF concept or not. An interesting issue for the warfighting CINC regards the amount of combat or mobility support needed. As the EAF concept matures and proves its worth, in-theater support could be reduced on the assumption that a rapid deployable tailored force is on call to provide effective support quickly.

The next step of the study looked at the amount of support required by the EAF for mobility crews. During the Phoenix Scorpion deployments, the most combat aircraft moved were 45 fighters and bombers. The notional AEF force structure includes 175 total aircraft of which 75 are designated for forward deployment (Peters, 1998: 14). The Phoenix Scorpion deployments moved only a portion of the total package, but provides a representative sample of what it would take to move a similar AEF. Since the AEFs are

dependent on the current crisis or contingency response needed, the flexibility to tailor the AEF packages is represented by the forces moved during the Phoenix Scorpion deployments.

Finally, the research provided an insight to the amount of change in opstempo associated with deploying and fighting under the EAF concept. Per deployment, the change in TDY days for the mobility forces only amounted to an additional day or two. However, the EAF concept is on a 90-day rotational cycle with two AEFs in the deployment phase at one time. Each 90 days, some or all of the two AEFs will deploy while the previous two AEFs would be redeploying. Per year, there would be four deployments and four redeployments adding to the mobility forces TDY days.

Tanker opstempo will change also, mostly depending on the amount of air refueling support needed during the deployment of the AEFs. This support varies depending on the amount of assets deploying and if they use an air bridge concept or enroute stopover. The air bridge concept sets up tankers at key locations enroute to provide air refueling support to deploying aircraft. This concept moves assets more rapidly since time is not wasted stopping along the route of flight for fuel. TDY days associated with the tankers attached to the AEFs depends on the amount of support needed in the theater. For this research paper, the amount of support was assumed constant for pre and post EAF implementation.

The research does indicate a slight increase in mobility TDY days associated with the EAF concept, but the changes are small. The changes are affected by the amount of support required, the urgency of the requirement, and the how well a unit organizes itself for the deployment. Scheduling efficiently as well as other best business practices can

also offset the changes. A more important issue is the surge of missions that come with moving an AEF quickly. For example, during Phoenix Scorpion I, C-5 crews flew 248 missions in a 28-day period. The change in TDY days show the effect of the deployments spread across the entire crew force, when in all actuality, only a small portion of all available crews were involved in the deployment. This surge of missions keeps those crews involved very busy.

### **Recommendations**

The greatest benefits associated with the EAF concept is the stability and predictability it brings to scheduling the assets required to support the warfighting CINCs. AEF deployments and redeployments are based on a known 15-month schedule. Units within the individual AEFs will or have already been designated. All this information is available far enough in advance to massage the remaining scheduling requirements into a manageable opstempo. Mobility requirements will obviously surge during the movement of an AEF, but keeping other mobility customers aware of these surge times, their requirements can be worked to avoid the surge.

Mobility surges can be also be reduced by looking at alternate sources of transportation and equipment sourcing. AEF deployments are determined well in advance and the long-standing contingencies such as Operation SOUTHERN WATCH are well defined. CRAF carriers were not included in the research, but play an integral part in mobility operations. CRAF carriers moving AEF equipment and people, or replacing Air Force assets in their regularly scheduled requirements can augment surge time periods. Another option would be organize the deploying equipment early and send it by sea. Sealift provides large capacity lift, but requires more lead-time. Operations

such as SOUTHERN WATCH are more suited to this option. The requirements are defined, deployment dates are known well in advance, and time is not as critical as it would be for a "pop-up" type crisis. One shortfall for this option is that most organizations do not own enough support equipment to sustain operations at home while their support equipment is in transit. More support equipment may be needed.

Another option would be to preposition more support equipment within the theater reducing the lift required for each AEF. New equipment can be purchased that would support the multiple types of airframes within the AEF. The Air Mobility Master Plan 1998 call for "multi-functional" Aerospace Ground Equipment (AGE) (AMC/XP, 1997, 5-77). This equipment is capable of supply air conditioning, electrical power, and ram air for engine starts. One multi-functional piece of equipment also reduces the need for spare parts and special tools for servicing.

### **Suggestions for Further Research**

The methodology used in determining the opstempo for mobility forces relied on analyzing data from past AEF operations. From that analysis, future opstempo was derived. Predicting future occurrences from past data is a useful tool, especially when there is no other data available for making the future predictions. At the time of this research, there was no data available on what units would deploy as part of an AEF and what type of equipment would be necessary. Time Phased Force Deployment Data (TPFD data) provides the specific equipment and personnel requirements for the units being moved. TPFD data is very useful in determining the amount of mobility capacity required for moving an AEF's equipment and people. Modeling programs such as Joint Flow and Analysis System for Transportation (JFAST) manipulates the TPFD data to

determine the mobility assets needed to move the AEF's equipment. Future studies should concentrate on modeling the TPFD data when available to determine a more precise requirement for airlift assets. This data can then be applied to the same methodology used to determine opstempo for the tanker requirements. An exact number of aircraft provides a better measure of crews required to fly the deployment missions.

Other research should be aimed at determining better ways to tailor forces for the deployment. The EAF concept relies on light forces. Being able to deploy with less equipment and sustain operations more efficiently reduces lift requirements and frees up mobility assets for more pressing missions. As the deploying AEFs become accustomed to deploying under the EAF concept, they will become more efficient in AEF deployment operations.

## **Appendix: Operations Supported by AMC**

### **1997 Operations**

**Able Sentry** peacekeeping operation in Macedonia Jan  
**Accurate Test** CENCOM command, control, communications systems test Apr  
**Adventure Express** Allied Command Europe (ACE) mobility force ftx  
**African Crisis Response Initiative** peacekeeper training exercise Sep  
**Agile Lion** JTF humanitarian assistance ftx in Germany Jul  
**Air Warrior** EUCOM Jan  
**Airpower Expeditionary Force (AEF) 97-1** CENTCOM deployment to Qatar Feb  
**AEF V** deployment of 366 AEW to Bahrain Sep  
**Amalgam Fabric Brave** NORAD ftx in Canada Aug  
**Amalgam Warrior** NORAD exercise Apr  
**Assured Lift** Ivory Coast, part of ECOMOG move of African peacekeeping forces in Liberia Feb  
**Atlas Drop** bilateral ftx in Tunisia Oct  
**Baltic Challenge** Partnership for Peace ftx in Estonia Jul  
**Beirut Air Bridge**  
**Bevel Edge** preparations for Cambodian NEO Jul  
**Blue Advance** ftx for defense of the Caribbean, takes place at GITMO Feb  
**Brave Eagle/Eagle's Talon** Partnership for Peace exercise in Poland deployment/redeployment Aug  
**Bright Star** CENTCOM exercise in Egypt Sep  
**Carib** medical engineering readiness exercise Mar  
**Central Enterprise** Central European air defense exercise Jul  
**CENTRAZBAT** multinational exercise with Russia and other states of the former Soviet Union, including longest, strategic, non-stop brigade airdrop in history, from the United States to Kazakhstan Sep  
**Checkered Flag** EUCOM Feb  
**Cobra Gold** exercise with Royal Thai armed forces Mar  
**Commando Sling** air to air training with Singapore Jan  
**Constant Vigil** follow-on to **Provide Comfort** aid to Kurds Jan  
**Cooperative Banners** NATO Partnership for Peace exercise in Norway May-  
**Cooperative Nugget** NATO Partnership for Peace exercise at Fort Polk Jun  
**Cope North** combined air defense exercise in Japan Nov  
**Cope Thaw** deploy/redeploy fighters in PACOM theater Apr-  
**Cope Tiger** cpx with Singapore and ftx with Thailand Jan  
**Cornerstone** bilateral engineering Partnership for Peace ftx with the Republic of Georgia Jun  
**Coronet Night Hawk** SOUTHCOM Feb  
**Deep Freeze** Antarctica resupply Mar  
**Desert Fox** ACOM Jan  
**Dynamic Mix** NATO interoperability ftx Sep  
**Early Vector** Special Operations ftx



**Eastern Castle** EUCOM engineering ftx Aug  
**Eastern Valor** ftx May  
**ECOMOG** support drawdown of African peacekeeping forces in Liberia Feb  
**Ellipse Charlie** PACOM cpx Aug  
**Fairwinds** humanitarian construction and civic assistance in Haiti Apr  
**Flintlock** special operations ftx in Africa and Europe Aug  
**Frequent Storm/Balanced Mint** joint/combined Special Operations training with 21st Command Regiment and CINCPAC's peacetime cooperative engagement strategy Apr  
**Frequent Storm/Balanced Torch** joint/combined Special Operations training and CINCPAC cooperative engagement Jul  
**Fuerzas Aliadas** Humanitarian nation building joint/combined ftx in El Salvador Jan  
**Fuerzas Aliadas-Cabanas** peacekeeping ftx with Bolivia, Argentina, Paraguay, and Uruguay Sep  
**Fuerzas de Defensas** cpx for defense of Panama Aug  
**Guardian Retrieval/ Phoenix Gauntlet** deployment for neo of Americans from Zaire Mar  
**Green Flag** multiservice electronic combat tactics Jan  
**High Flight/Phoenix Lion** search and recovery operation for AMC C-141 and German TU-154 lost over the south Atlantic Sep  
**Indonesian Fires 97** fire suppression Oct  
**Inherent Fury** CENTCOM Nov  
**Intrinsic Action** periodic combined ftx in Kuwait Jun  
**Joint Guard** follow-on to **Joint Endeavor** support to Bosnia peacekeeping Jan  
**JTFEX 97-2** ACOM Carrier Battle Group FLEETEX proceeded by USMC SOCEX, includes strategic airdrop Mar  
**Laser Strike** counterdrug operation in Latin America  
**Linked Seas** SACLANT special maritime ftx May  
**Marine Lift** SOUTHCOM Jan  
**Measured Response** CONUS ftx training public officials to counter chemical and biological terrorism Jun  
**Med Flag 97** EUCOM small scale medical training exercise series in Africa Mar  
**MEDCEUR** Partnership for Peace medical exercise in Moldova May  
**New Horizons Belize** humanitarian civic assistance Jan  
**New Horizons El Salvador** engineering and medical exercise Jul  
**New Horizons Guyana** engineering ftx in Guyana Jun  
**New Horizons Haiti** medical and engineering exercise Jul  
**New Horizon Panama** nation building civil engineering ftx Jan  
**New Horizon El Salvador** military to military training in construction and medicine May  
**Northern Edge** ALCOM cpx/ftx exercising JTF interoperability in Alaska Mar  
**Northern Viking** ftx with Icelandic forces Jul  
**Northern Watch** follow on to **Provide Comfort** assistance to Kurds in northern Iraq Jan  
**Peace Sun** CENTCOM Saudi foreign military sales Mar-  
**Peaceful Eagle** Partnership for Peace humanitarian exercise in Bulgaria May

**Phoenix Alchemy** Engineering ftx in Jordan and Egypt Apr  
**Phoenix Arch** SOF ftx in Israel Apr-  
**Phoenix Banshee** airborne ftx in Tunisia Jul  
**Phoenix Bird** NATO Partnership for Peace engineering exercise in Republic of Georgia  
 Jun-  
**Phoenix Boom** ACOM Jan  
**Phoenix Castle** SOF ftx in Senegal and Congo Feb  
**Phoenix Cestus** air ftx with Israeli Defense Force Jan  
**Phoenix Club** fighter ftx in Turkey Apr-  
**Phoenix Fritter** small scale LIVEX in Spain Apr  
**Phoenix Genie** SOF ftx in Kenya  
**Phoenix Halibut** train African forces in peacekeeping and humanitarian operations Jul  
**Phoenix Halite** SOF ftx to Jordan Feb  
**Phoenix Harem** SOF TACAIR in Bahrain May  
**Phoenix Hotel** NATO central region air exercise May  
**Phoenix Hump** Ace Mobile Force ftx in Norway Feb  
**Phoenix Knife** Army ftx in Kuwait Feb  
**Phoenix Phosphate** SOF ftx in Oman Mar  
**Phoenix Rider** SOF training exercise with Lithuania, Macedonia, Czech Republic Apr-  
**Phoenix Rook** SOF ftx in Ethiopia Apr  
**Phoenix Scorpion** augmentation of Southern Watch Nov  
**Phoenix Sphinx** SOF ftx in Eritrea Apr  
**Phoenix Slipper** NATO ftx in Denmark Aug  
**Phoenix Spitton** Army ftx in Pakistan May  
**Phoenix Tasse**, SOF ftx in Kuwait Mar  
**Phoenix Tent** ftx to Oman, test of C3 systems Mar  
**Phoenix Trout** NATO exercise in the Baltic Sea Jun  
**Phoenix Veil** ACE mobile force livex in Turkey May  
**Pivot Sail** transport of MIG-29 fighters from Moldova under the Cooperative Threat  
 Reduction Act Oct  
**RSO&I** support of mutual defense treaty with Republic of Korea Mar  
**Roving Sands** ACOM exercise employing army artillery, USAF, USMC and allied air  
 assets Feb  
**Sentry Aloha** PACOM Jan  
**Shared Endeavor** bilateral airborne exercise with Botswana Mar  
**Silver Eagle** EUCOM ftx in Africa Aug  
**Southern Frontier** PACOM exercise  
**Southern Watch** No fly zone over southern Iraq Jan  
**Tandem Thrust** PACOM ftx with Australia for amphibious operations Jan  
**Tradewinds** joint/combined ftx promoting Caribbean stability Feb  
**Trailblazer** USAFE ftx in Germany Sep  
**TRANSPAC** deployment and redeployment of fighter units Mar  
**Typhoon Paka** relief to Guam Dec-97 Jan 98  
**Unified Endeavor** NATO CPX Oct  
**Urgent Wing** ACOM Jan

**Woodland Cougar** ACOM rescue exercise Aug-

## **1998 Operations**

**Able Sentry** peacekeeping operation in Macedonia Jan

**African Crisis Response Initiative/Phoenix Halibut** peacekeeper training exercise Jan

**Amalgam Fabric Brave** Jan

**Auburn Endeavor** airlift of weapons-grade uranium from the Republic of Georgia to Scotland Apr

**Autumn Shelter** anticipated noncombatant evacuation from the Democratic Republic of the Congo Aug

**Baltic Challenge** NATO exercise in Lithuania "in the spirit" of the Partnership for Peace program Jul

**Big Drop IV** airdrop phase of Joint Task Force Exercise Purple Dragon Jan

**Central Enterprise** NATO Central Region ftx May

**Commando Sling** air to air training with Singapore Jan

**Cobra Gold** ftx with Royal Thai armed forces May

**Cope Thunder** air-to-air combat exercise in Alaska May

**Cope Tiger** cpx with Singapore and ftx with Thailand Jan

**Coronet Night Hawk** SOUTHCOM Feb

**Deliberate Forge** follow-on to Deliberate Guard Jun

**Deliberate Guard** NATO air operations in support of peacekeeping operations in Bosnia Jan

**Desert Fox/Phoenix Scorpion IV** operations against Iraq following Iraqi intransigence over continuing UN weapons inspections Dec

**Desert Thunder/Phoenix Scorpion II** augmentation of Southern Watch following Iraqi intransigence over continuing UN weapons inspections Feb

**Desert Thunder/Phoenix Scorpion III** augmentation of Southern Watch following Iraqi intransigence over continuing UN weapons inspections Nov

**Distant Thunder** NATO Southern Region ftx Apr

**Eastern Castle** CENTCOM engineering ftx Apr

**Eastern Meteor** CENTCOM Jan

**Eastern Viper** CENTCOM engineering ftx Apr

**Expeditionary Force Experiment 98** testing of command control communications concepts and technology Sep

**Freedom Banner** ftx in Thailand Mar

**Fuerzas Aliadas** humanitarian nation building joint/combined ftx in Guatemala Jan

**Haydrop** airdrop of hay to feed cattle in New Mexico following a winter storm Dec 97-Jan 98

**Hurricane Georges** relief to Puerto Rico, the Dominican Republic, and the southeastern United States Sep

**Joint Forge** follow-on to Joint Guard support for Bosnia peacekeeping Jun

**Joint Guard** follow-on to Joint Endeavor support for Bosnia peacekeeping Jan

**JTFEX 98-1** ACOM Carrier Battle Group FLEETEX Feb

**Keen Edge** PACOM ftx in Japan Feb

**Keiko** airlift of killer whale from Oregon to Iceland Sep  
**Laser Strike** counterdrug operation in Latin America Jan  
**Mitch** hurricane relief to Honduras and Nicaragua Nov  
**New Horizons Bahamas** ftx for US and allied nation forces in humanitarian and civic assistance operations through construction and medical projects Mar  
**New Horizons Ecuador** ftx for US and allied nation forces in humanitarian and civic assistance operations through construction and medical projects May  
**New Horizons Haiti** ftx for US and allied nation forces in humanitarian and civic assistance operations and promotion of democracy through construction and medical projects Jan  
**New Horizons di Peru** ftx for US and allied nation forces in humanitarian and civic assistance operations through construction and medical projects Feb  
**New Horizons El Salvador** ftx for US and allied nation forces in humanitarian and civic assistance operations through construction and medical projects Jan  
**Northern Edge** PACOM ftx in Alaska Jan  
**Northern Watch** follow on to Provide Comfort assistance to Kurds in northern Iraq Jan  
**Cooperative Osprey** NATO Partnership for Peace ftx in North Carolina Jun  
**Phoenix Duke** support of potential NATO strike against Serbia for continuing human rights violations in the province of Kosovo  
**Phoenix Flame** airlift of firefighters to combat fires in Florida Jul  
**Phoenix Snake** EUCOM Jan  
**Red Flag** combined/joint air combat training exercise Feb  
**Resolute Response** medical and law enforcement support to Kenya and Tanzania following embassy bombings Aug  
**Shining Presence** simultaneous operation with Desert Fox airlifting Patriot missiles to Israel Dec  
**Strong Resolve** NATO ftx in Norway, Portugal, and Spain testing the ability of forces from NATO and Partnership for Peace nations to respond to simultaneous crises in different countries Feb  
**Southern Watch** no-fly zone over southern Iraq Jan  
**Southwest Asia** redeployment reducing size of Southern Watch force June  
**Tradewinds** SOUTHCOM ftx in Belize Mar  
**Typhoon Paka** relief to Guam Dec 97-Jan 98  
**Unitas** combined exercise with major South American maritime nations and Paraguay to promote hemispheric interoperability Jul  
**Winter Storm Relief** northeastern United States and Canada Jan

## 1999 Operations

**Able Sentry** peacekeeping operation in Macedonia Jan  
**African Crisis Response Initiative** peacekeeper training exercise Jan  
**Amalgam Warrior** NORAD ftx Jan  
**Atlas Drop** ftx Jan  
**Deliberate Forge** NATO air operations in support of peacekeeping operations in Bosnia Jan

**Desert Fox Redeployment /Phoenix Scorpion IV** operations against Iraq following Iraqi intransigence over continuing UN weapons inspections Jan

**Eastern Castle** CENTCOM engineering fix Jan

**Joint Forge** support for Bosnia peacekeeping Jan

**Laser Strike** counterdrug operation in Latin America Jan

**Mitch** hurricane relief to Honduras and Nicaragua Jan

**New Horizons** Dominican Republic fix for US and allied nation forces in humanitarian and civic assistance operations through construction and medical projects Jan

**New Horizons Haiti** fix for US and allied nation forces in humanitarian and civic assistance operations and promotion of democracy through construction and medical projects Jan

**New Horizons-St. Lucia** fix US and allied nation forces in humanitarian and civic assistance operations through construction and medical projects Jan

**Northern Watch** no fly zone in northern Iraq Jan

**Phoenix Duke II** support of NATO strike against Yugoslavia for continuing human rights violations in the province of Kosovo Feb

**Shining Hope** humanitarian aid for ethnic Albanians expelled by Yugoslavia from the Kosovo region April

**Southern Watch** no-fly zone over southern Iraq Jan

**Unitas** combined exercise with major South American maritime nations and Paraguay to promote hemispheric interoperability Jan

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## Vita

Major Martin T. Gimbus was born 27 January 1963, in Rochester, Pennsylvania. He graduated from Western Beaver High School in Industry, Pennsylvania in April of 1981. He entered undergraduate studies at the University of Pittsburgh in Pittsburgh, Pennsylvania where he graduated with a Bachelor of Science degree in Information Sciences in 1985. He was commissioned through AFROTC at the University of Pittsburgh on 28 April 1985.

His first assignment was at Fort Rucker, Alabama as a student in Undergraduate Pilot Training – Helicopters in January of 1986. In February 1987, he was assigned to Detachment 9, 37th Air Rescue Service, Whiteman AFB, Missouri where he served as Chief of Standardization and Evaluation in the HH-1H Helicopter and received a Master of Business Administration. He was selected to attend Fixed Wing Qualification Training at Vance AFB, Oklahoma. Upon completing his training, he was assigned to the 99th Air Refueling Squadron, Robins AFB, Georgia where he served as Assistant Operations Officer. His next assignment was to Headquarters Air Mobility Command, Plans and Programs Directorate, Scott AFB, Illinois where he served as a Strategic Concepts Officer, then Long-Range Plans Officer responsible for facilitating the Equipment and Roadmap Sections of the Air Mobility Master Plan.

In May of 1998, Major Gimbus was assigned to the Air Mobility Warfare Center as a Student in the Advanced Study of Air Mobility (ASAM) program. After graduation, he will crossflow to the C-5 at Dover AFB, Delaware where he will be assigned to the 9th Airlift Squadron.



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The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. **Please return completed questionnaire to:** AIR FORCE INSTITUTE OF TECHNOLOGY/ ENA 2950 P STREET, WRIGHT-PATTERSON AFB OH 45433-7765. Your response is **important**. Thank you.

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3. **Please estimate** what this research would have cost in terms of manpower and dollars if it had been accomplished under contract or if it had been done in-house.

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4. Whether or not you were able to establish an equivalent value for this research (in Question 3), what is your estimate of its significance?

a. Highly      b. Significant      c. Slightly      d. Of No  
Significant      Significant      Significance

5. Comments (Please feel free to use a separate sheet for more detailed answers and include it with this form):

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